

## ABSTRACT

An optical heterostructure is provided comprising a matrix and first and second bandgap regions defined in the matrix. The second bandgap region is characterized by a periodic arrangement of inclusions in the matrix. The inclusions have an index of refraction substantially different than the index of refraction of the matrix. The first and second bandgap regions alternate in succession along a primary dimension of optical propagation of the heterostructure device to define a succession including at least one bandgap region of the first type interposed between a pair of bandgap regions of the second type. The first bandgap region defines a first optical bandgap of the optical heterostructure. The second bandgap region defines a second optical bandgap of the optical heterostructure. The spacing between the band gap regions of the second type created by the interposition of the first band gap region there between is such that the first optical bandgap is centered at a different wavelength than the second optical bandgap and such that a transmission bandwidth is defined between the first and second optical bandgaps.

5 Accordingly, the first and second bandgap regions each function as optical barriers and the device as a whole comprises a multi-barrier photonic heterostructure.

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